

REMARKS

In response to the Office Action dated August 1, 2003, which was made final, and in conjunction with the Request for Continued Examination (RCE) submitted herewith, claims 1, 2 and 10 have been amended, claims 11 and 12 have been cancelled, and new claim 13 has been added. Claims 1-10 and 13 are in the application. Re-examination and re-consideration of the application, as amended, is requested.

Record is made of a telephonic interview that occurred on December 1, 2003, between Examiner Benny Lee, George Gates, the below-signed attorney, and Kent Ledwell, Canadian patent agent for the assignee. The merits of the final rejections were discussed, as were ways of distinguishing the claims from the prior art.

With regard to the Office Action, the Applicants note that the Examiner objected to the claims presently on file under 35 USC 112 and 35 USC 103. The Applicants do not agree with the Examiner's position, and in view of the above amendments and the following arguments, asks that these objections be withdrawn.

On page 2, the Examiner rejected claims 11 and 12 under 35 USC 112. The Applicants note that both of these claims have been cancelled. The Applicants submit that this objection is now moot.

On pages 3 - 4 of the Final Action, the Examiner rejected claims 1-12 under 35 USC 103(a), alleging that these claims are obvious having regard to Grundmann or Pawley, in view of Miya et al. The Examiner also addressed arguments made by the Applicants on this issue, on pages 4 - 6. The Applicants submit that the amended claims are not obvious in view of the cited references, and asks that the Examiner withdraw this rejection.

To begin with, the Applicants note that the two tests for obviousness as outlined in section 706.02 (j) of the Manual of Patent Examination Procedure (MPEP) read as follows:

"First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. In re Vaack, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)." (emphasis added); and

"The initial burden is on the examiner to provide some suggestion of the desirability of doing what the inventor has done. "To support the conclusion that the claimed invention is directed to obvious subject matter, **either the references must expressly or impliedly suggest the claimed invention** or the examiner must present a **convincing line of reasoning** as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." Ex parte Clapp, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985)." (emphasis added)

The Applicants submit that the requirements of neither of these tests have been satisfied by the Examiner.

General Arguments Regarding Non-Obviousness of the Claimed Invention

It is well accepted that unexpected results, and fulfilment of a long-felt need are evidence of non-obviousness. In this case, there is clear evidence of such characteristics:

1. the Inventors themselves were surprised at the high-Q performance of the filter that was invented using low-Q integrated components. These characteristics are now explicit limitations of the amended independent claims 1 and 2. This "unexpected result" was a surprise even to the Inventors;
2. at the time of the invention, others in the industry had been using SAW filters as described in the Background to the Invention, or active components to provide high-Q integrated filters, while the design of the invention uses passive components only. The invention satisfies a long felt need, in providing a fully integrated, high-Q passive filter. The invention is also a development in a direction contrary to that in which the prior art is teaching.

It must be appreciated that a great deal of research has been performed in the area of integrating filters for wireless and microwave applications. The market for cellular telephones for example, is enormous, and the pressure to reduce costs by developing high quality integrated components is immense. In spite of this huge research effort, no other parties have discovered the circuit of the invention. The satisfaction of this long felt need must be considered persuasive; and

3. the Inventors published a paper and made a presentation of the invention at an IEEE conference. This was the same paper that the Examiner tried to apply against the claims in the first Office Action: "A Highly Linear Bipolar 1V Folded Cascode 1.9 GHz Low Noise Amplifier", by B. Ray, T. Manku, R.D. Beards, J.J. Nisbet and W. Kung, presented

at the IEEE BCTM (BiPolar/BiCMOS and Circuits and Technology Meeting) conference in 1999.

The published article was reviewed by a panel of experts for their approval, which certainly speaks to the novelty and value of the work. The presentation at the conference was very well received; surely, the opinions of these industry experts must carry a great deal of weight.

Two other general arguments against the obviousness rejection are as follows. They will be expanded upon in greater detail hereinafter.

First, there is no suggestion or motivation to research vacuum tube and discrete technology (the subject of the Pawley and Grundmann references), as the current teaching in the art of RF technology is moving in a different direction. As explained in paragraphs [0010] - [0012] and at the end of paragraph [0012] of the specification, SAW filters are generally used in the art rather than passive or active LC filters. Because of this, one would not expect a skilled technician to go against the current teachings in the art (toward SAW filters) and attempt to improve on discrete LC filter designs which are decades old.

Second, none of the three cited references describe an integrated resistor, which is an explicit limitation in each of the claims. Thus, the requirement that the prior art references must teach or suggest all the claim limitations, has certainly not been met.

Other more specific arguments follow.

Regarding Claims 1 and 2, in View of Pawley and Miya et al.

The Applicants had previously argued that the Pawley reference was remote from the invention and could not be applied in combination with the Miya reference. The Examiner rejected this argument, alleging that the Pawley circuit "has a filter characteristic (e.g., the bridge T-type network has a cut-off frequency)."

The Applicants submit that it is not appropriate to take a selected group of components from a circuit diagram in the Pawley patent, analyse them to identify a filter characteristic, and then apply this reference in combination with another reference to allege obviousness. There is simply no motivation for the skilled technician to seek out this reference, make the necessary changes, and arrive at the claimed combination as alleged by the Examiner.

The invention addresses the problem of filters, but the Pawley reference is directed to phase shifting networks. In an effort to find information on filters, the skilled technician simply would not find this remote reference. The Applicant notes that Pawley reads:

4. in the title: "Phase Shifting Network";
5. at column 1, lines 1 - 2: "This device relates to electrical voltage phase shifting networks"; and
6. at column 2, lines 42 - 45: "It is therefore one object of this invention to provide an electrical network operative to vary voltage phase over a wide range with constant attenuation."

Furthermore, the Applicants note that if the skilled technician did find the Pawley reference, all of its design details regarding component values are completely different from those of the invention because their circuit is being used for a different purpose. Pawley does not describe a filter, let alone one for operation at microwave frequencies as claimed.

The Applicants note that the amended claims 1 and 2 now include the explicit limitations of "each of said inductor, capacitors and resistor being a low-Q integrated element, yet wherein said integrated RF filter circuit results in a high-Q filter at microwave frequencies." The Applicants note that the combination of the Pawley and Miya references do not describe either of the following, or make any suggestion in the direction of:

7. the use of low-Q integrated elements, in such a way that results in a high-Q filter; or
8. the use of a filter at microwave frequencies.

Miya et al. teach a low-Q filter using low-Q components. Pawley, of course, does not teach the use of integrated components at all, so of course, there is no teaching in this direction.

The Examiner has not tabled any evidence that the alleged combination of references will provide a high-Q filter using low-Q integrated components. Thus, we do not believe that the Examiner has satisfied the test for obviousness.

Regarding Claims 3 and 4, in View of Pawley and Miya et al.

The Examiner rejected claims 3 and 4 on the grounds that resistor 16 of the Pawley patent was selected to be equal to the impedance of the inductor and capacitors at their resonant frequency. The Applicants do not agree.

Reference is made to resistor 16 in three locations of the Pawley patent, and in no place is reference made to selection of a resistor "to be equal to the impedance of the inductor and

capacitors at their resonant frequency". In each case, however, the resistor 16 is selected to vary the phase shift of the circuit:

9. at column 6, lines 17 - 18, which reads: "permitting variation of phase shift by means of a control resistance 16 ...";
10. at column 6, lines 33 - 36, which reads: "the given electrical characteristics attributable to the network permitting wide range of phase shift with constant attenuation as resistive component 16 is varied ..."; and
11. at column 8, lines 7 - 9, which reads: "... enables this network to shift time phase by varying the impedance value C of network arm 16."

Again, Pawley does not describe a filter at all, but a phase shifter, which is unrelated to the claims of the present patent application.

The Miya reference does nothing to address these shortcomings of the Pawley reference as it does not mention resistors at all. There is also nothing in the combination of Pawley and Miya to address this.

Thus, surely, claims 3 and 4 must be considered allowable.

Regarding Claims 5 - 10, in View of Pawley and Miya et al.

The Examiner did not provide any arguments as to why claims 5 - 10 were rejected as obvious in view of Pawley in combination with Miya. The Applicants therefore ask that these claims be allowed.

Regarding Claims 1 - 10, in View of Grundmann and Miya et al.

The Examiner did not present detailed arguments regarding the application of Grundmann and Miya to the claims. In general, the Applicants submit that the arguments outlined above also apply to this combination of references.

In short, arriving at the claimed filter relying only on the Grundmann and Miya references would require the skilled technician to:

12. make the assumption that he should seek out filter designs applied to vacuum tube technology of 66 years ago. This would require him to disregard the thousands of academic articles, text books and patents which have entered the public domain in the intervening period, many of which teach in a different direction than that of the claimed invention (for example, the current teaching being towards the use of SAW filters).

This decision would also require the assumption that the vacuum tube technology would have something to contribute despite that it is unrelated to any of the problems of the invention; i.e., the design of an integrated (per lines 1, 2 and 7 of claim 1), passive filter (per line 7 of claim 1) for use at microwave frequencies (per lines 1 and 7 of claim 1). It is difficult enough to modify recent developed integrated RF designs for different applications, let alone attempting to transfer the 66 year-old technology of the Grundmann patent into an integrated RF environment. There would simply be no reasonable expectation of success as required by the test in the MPEP;

13. once the Grundmann reference has been found, the skilled technician would have to isolate the particular filter components of the invention, from the circuit diagrams of the Grundmann patent. This would require at least some analysis because the Grundmann filter is being used in quite a different application;
14. once the filter of interest has been isolated, it would have to be re-designed for operation at microwave frequencies required by the invention.

It is unclear how this step can be rationalized in an obviousness argument because there is no way to speculate as to whether the circuit will operate effectively at the claimed microwave frequencies (per lines 1 and 7 of claim 1). The performance of filters is non-linear, so there is nothing obvious about how a filter used in one application, will perform in another;

15. one would then have to seek out the Miya patent, in an effort to design an integrated version of the filter. It is difficult to see how the Miya patent would be located because:
 - a. Miya describes devices that are quite different from that of the invention. Miya generally describes band pass filters, while the invention is focussed more on notching filters; and
 - b. Miya does not describe the use of resistors, or the layouts of capacitors, inductors and resistors in a way which is similar to the layouts of the invention.

There is also no teaching in either Grundmann or Miya about how components and values could be selected for the integrated microwave filter. Clearly, Grundmann offers no assistance in this regard as it is directed to discrete components at much lower frequencies. The Miya patent is also of little assistance because its filter designs are completely different from those of the invention.

The Miya patent, for example, does not mention resistors at all, so the combination of the Grundmann and Miya patents clearly offers nothing regarding the design of a suitable integrated resistor for the claimed filter; and

16. the skilled technician would then have to make the determination that the circuit could physically be reduced to fit on an integrated circuit at the claimed microwave frequencies. If any of the capacitors, inductors or resistors had to be very large, the circuit could not be integrated.

There is nothing in either of the Grundmann or Miya patents which suggest that this could actually be achieved.

A major flaw in this obviousness argument is that neither of the cited references suggests that a filter will result using low-Q integrated components. The Miya reference simply describes low-Q filters using low-Q components. Q is determined by the Q of the components, and can only be increased by increasing the number of tank elements (per Figure 8). The Grundmann elements, of course, are not integrated, so they contribute nothing to the development of a high-Q integrated filter.

Thus, the test for obviousness clearly has not been satisfied. As outlined above, there are too many gaps in the logic to combine the Grundmann and Miya references to arrive at the claimed invention - it certainly could not be said that the skilled technician would be led by this combination of references, to the claimed invention in an obvious way. Indeed, the requirement for a "suggestion or motivation" to seek out the long-ignored Grundmann patent and apply it in a remote application using the teachings of the Miya patent is lacking, so the skilled technician would not even attempt to make the combination alleged by the Examiner.

The dependent claims, of course, also recite a large number of additional limitations which are not mentioned in either Grundmann or Miya - integrated resistors, and integrated variable capacitors in the filter circuit, for example. These dependent claims are also clearly allowable in view of this combination of references.

Thus, the Applicants submit that the Examiner has not satisfied the requirements of the obviousness test, and asks that the Examiner withdraw these objections under 35 USC 103.

In view of the above, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited.

Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicants' undersigned attorney.

Respectfully submitted,

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